NEW SATYRIDAE OF THE GENUS *OREIXENICA* FROM SOUTH AUSTRALIA AND NEW SOUTH WALES

TOGETHER WITH NOTES ON THE RECENT CLIMATE OF SOUTHERN AUSTRALIA

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Plate xii.

A new form of the Eastern Australian Satyrid butterfly genus *Oreixenica*, related to *O. kershawi* Miskin 1876, was taken during February, 1948, in a coastal swamp west of Millicent in the South-East of South Australia.

Only a year previously *Tisiphone abeona* Donovan 1805 was described from Lake Edward (Tindale, 1947 (1)). The presence of *Tisiphone*, relatively sensitive indicator of a humid climate, had suggested the possibility of the occurrence of other moisture-loving species of butterflies in the swampy country of the South-East, nevertheless to find another so soon was an agreeable surprise.

Previously known forms of the *Oreixenica kershawi* species complex were:

Oreixenica kershawi kershawi Miskin 1876. Victoria: Mount St. Bernard, Mt. Erica, Wandin, Toora, Fern Tree Gully, the Dandenong Range, Belgrave and Lorne, flying from January to early April. (Plate xii, fig. 1–4).

Oreixenica kershawi ella Olliff 1888. New South Wales: Barrington Tops, above 3,000 ft., from December to early February. (Plate xii, fig. 13–16).

Examination of the South Australian Museum series revealed the presence of a third race, hitherto undescribed, from the Federal Capital Territory. There are thus four races to be recognized. These four show considerable differences, one from the other; at least two, including the South Australian one, might almost be regarded as having attained specific status, save that all four inhabit separate geographic areas, occupy similar ecological niches, and suggest thereby that they have been derived from a single species, members of which had become isolated in four separate geographic areas by the development of climatic barriers. The environments are not everywhere identical. It will be noticed that Waterhouse (1932) considered *O. kershawi* was always found where the Australian beech (*Nothofagus*) is growing. This is certainly not the case where the new South Australian form is concerned. The two new races extend the range of the species without providing any closer links between the forms.

The new race from South Australia is rather distinctive since, so far as may be judged from a single pair, it is the smallest yet known; the form from the Federal Capital Territory is very large.

OREIXENICA KERSHAWI KANUNDA subsp. nov.

Plate xii, Fig. 5-8.

♀ Wings above black with golden-brown spots and bands; forewings with four principal spots and several smaller ones surrounding a sub-quadrate black area at the forking of veins M_3 and Cu_{1a}. There are four spots along the costa of which the subapical one is divided into three conjoined spots by darker veins; there is a small, black, virtually blind eyespot and four small narrow subterminal marks forming a linear series. The hindwing bears a series of spots forming incipient bands pointed towards a large tornal ocellus which has a small white centre; the principal band, which commences on costa at one-half, is distinctly broken at the cell. Forewings beneath dull black with pale golden-brown and richer brown markings, patterned somewhat as above, but becoming paler towards apex of wings; the subterminal series of brown spots found above replaced by an outwardly concave and rather conspicuous subterminal white fascia. Hindwings beneath rich brown with silvery-white bands pointed to a large ocellus near hinder angle; a smaller second ocellus near apex; the principal silvery-white band from costa at one-half to ocellus is interrupted at the apex of the cell. Expanse 35 mm.

♂ Similar to female, but smaller, and with traces of a sex brand on the forewing above, extending from near middle of hind margin to the vicinity of the apex of the cell. Expanse 33 mm.

Loc. South Australia: Canunda Swamp, 8 miles west of Millicent (holotype a female, and allotype male, registered number I. 18963, in South Australian Museum), taken 23rd February, 1948, by N. B. Tindale. Victoria: Dartmoor, two males, taken January 1940, by F. Erasmus Wilson; now in collections of M. W. Mules and F. E. Wilson. The chosen name is based on an aboriginal word.

Canunda Swamp is situated about a mile south-west from the ruins of the old homestead on Canunda Station and immediately behind the innermost of the high Recent sand dune ridges which range along the present coastline to a depth of about two miles from the sea coast.

The first example of the butterfly was seen, and lost, on 21st February. It was a worn female, which was flying, and alighting, in dense ti-tree and sword-grass thickets. A second visit, two days later, was more successful. Four hours of work, beating and quartering the narrow swamp area over a distance of a quarter of a mile, brought to the net two examples. One was a slightly worn male taken at about 10 a.m., and the other a freshly emerged female captured just before noon. The insect may be very local, since both chanced to be taken within five yards of the place of original sighting of the species. The weather was dull, inclining to rain, but there were glints of sunshine. The butterflies sluggishly flew at about waist level among head high tangles of a purple-flowered ti-tree, probably *Melaleuca squamea*, and sword grass (*Gahnia* cf. *trifida*). They settled on the tips of ti-tree branches with their wings partly open and oriented to catch a maximum of sunshine. The ground underfoot was wet and covered with intensely green native grasses. The presence of larval trombiculid mites made collecting conditions uncomfortable.

ORIXENICA KERSHAWI PHRYNE subsp. nov.

Plate xii, Fig. 9–12.

♂ Wings above black with pale golden-brown spots and bands; forewings with five principal spots forming a rough circle around a black area at the forking of veins M_3 and Cu_{1a}; this black area is traversed by a faint oblique line of sex scales; there are four spots along the costa, of which the subapical one is the smallest and divided by the veins into three parts, the next one is also divided into two by a vein, the costal and smaller portion surrounded by a narrow golden-brown ring and touching a rather rectangular pale brown spot; there are three indistinct subterminal linear marks and traces of a fourth. Hindwing with a series of spots forming incipient bands pointed towards a large white-centred tornal ocellus; the principal band is of medium width, forming a single irregular fascia which is strongly constricted about the middle of its length. Forewings beneath dark brown with golden-brown markings, which, near the costa, become almost white, a white subterminal fascia from near apex to near hind margin, which is black. Hindwings beneath pale brown with dull silvery-white bands pointing to a medium-sized ocellus near hinder angle; a second smaller ocellus near apex; the principal white band from costa at one-half to ocellus is wide; it is constricted only at the cell. Expanse 44 mm.

Loc. New South Wales: Lee Spring, Federal Capital Territory (holotype a male and paratype male, marked I. 18961 in South Australian Museum), taken 19th February, 1938, by Mr. D. F. Waterhouse; also a third specimen taken 26th February, 1938, in collection of Mr. M. W. Mules.

This form is distinctive owing to its large size, the pale brown colour of the hindwings beneath, and the form of the median fascia of the hindwings, above and below. The more obvious differences between the forms of *O. kershawi* may be set out as follows:

	kershawi	*kanunda*	*phryne*	*ella*
Expanse of male	35–42 mm.	33 mm.	43–44 mm.	38–43 mm.
Expanse of female	38–41 mm.	35 mm.	—	37–40 mm.
Colour of wing markings above	golden-brown	golden-brown	pale golden-brown	orange-brown
Colour of hindwings beneath	dark chocolate-brown	rich brown	pale brown	dull brown
Form of brown wing-markings above	separate and small	conjoined and large	separate and medium	conjoined and medium
Width of median fascia on hindwing above	narrow	medium	medium	wide
Form of median fascia above	separated into 4–5 conjoined spots	two bars conjoined in middle	single bar strongly constricted in middle	single bar constricted in middle
Width of silvery-white median fascia on hindwing beneath	relatively narrow	wide	wide	very wide
Form of median fascia on hindwing beneath	divided in two at cell	strongly constricted at cell	constricted at cell	not markedly constricted at cell

TISIPHONE ABEONA ANTONI Tindale, 1947.

Since this race was described from Lake Edward and the Grampians, Dr. R. V. Southcott, whose initials were, in the original paper, inadvertently misprinted as A.V.S., has returned to his former collecting spot at McKenzie Creek in the Grampian Mountains. Between 31st December and 4th January, 1948, he took a fresh series of seven males and five females. This useful collection confirms the distinctive character of the western race of *Tisiphone abeona*. Mr. F. E. Wilson has written to say that he took specimens of the species at Dartmoor in 1939.

RECENT CLIMATE OF SOUTHERN AUSTRALIA IN THE LIGHT OF THE DISCOVERY OF *OREIXENICA K. KANUNDA* TINDALE, 1948.

In reporting the discovery of the butterfly *Tisiphone abeona antoni* (Tindale, 1947 (1), p. 616) at Lake Edward, some inferences were made on the climate of Recent time in the South-East of South Australia.

It was concluded that the distribution of races of *Tisiphone* seemed to be controlled by relatively strict moisture and temperature requirements and that at Lake Edward in South Australia, at Dartmoor in Victoria, and in the Grampian Mountains, Victoria, the climatic conditions were suited to it, but that any marked deterioration in climate in the direction of greater aridity would have been likely to have caused the butterfly to become extinct.

The presence of a buffer area represented by the Grampian Mountain massif might be considered to have afforded *Tisiphone a. antoni* some measure of protection against minor fluctuations in climate even at the outlying habitat of Lake Edward, in view of a possibility that recolonization of the restricted lake area might be possible from this climatically more varied area. This did not alter the general inferences to be drawn from the presence of a separate race of *Tisiphone* in the Grampians, Dartmoor and Lake Edward areas, separated from *T. a. albifascia* by almost the whole width of Western Victoria.

It was inferred that, following very moist and cool conditions leading to colonization of the whole of Western Victoria by *T. abeona*, the past history of the area, over a period of time sufficiently long to have permitted the formation of a distinctive race, was one of relatively cool moist conditions. These conditions might be tending to become somewhat drier and less favourable for *Tisiphone*, since its habitable niche as a race appeared to have contracted to a series of smaller refuge areas within the larger area of its distribution.

The occurrence of an additional moisture-loving species in the South-East of South Australia, *Oreixenica k. kanunda*, appears to afford a further measure of confirmation for such inferences, indicating that the immediate past history of this part of Southern Australia may have been one of transition from a relatively cool moist climate to one somewhat warmer and drier.

The period of optimum climatic conditions apparently was sufficiently long to have permitted the spread of *O. kershawi* from the Eastern Coast. After the Western area was isolated, a sufficient time elapsed to permit the development of particularly well-defined subspecific differences between the newly isolated South Australian and the Eastern Victorian forms. That *O. kershawi* has a restricted tolerance to climatic variation is shown by its occurrence in the race *ella* only at elevations above 3,000 feet at the northern limit of the reported range of the species; in the race *kershawi* it occurs on mountains at medium elevations (about 500 ft.–1,500 ft.) in Eastern Victoria, and down to sea level, principally at Lorne, in a cool and humid part of Southern Victoria. It has not been reported in the drier districts of Western Victoria. Mr. F. E. Wilson took two males which are very close to the type specimens, and clearly establish this western race. It is probable that like *Tisiphone*, the butterfly will be found in the Grampians and perhaps in suitable swampy areas near Cape Bridgewater and Portland.

The coastal swamps of the Millicent district and the river valley at Dartmoor provide a refuge which seemingly has enabled this Satyrid to maintain an existence even after the suggested decline in its climatic optimum. It may be noted that the specimens are the smallest of the species so far reported. Before the artificial draining of the large Millicent swamps in the latter part of last century, its distribution may have been somewhat more widespread than at present. It seems in any case to be a relict form, cut off from its eastern relatives and left over from a previously somewhat more favourable climatic era in South Australia.

It is of further interest to note that Burns (1947) described from Dartmoor a race, *wilsoni* of *Heteronympha cordace*, which represents yet another moist climate Satyrid butterfly. The parent race has a fairly wide distribution in the south-eastern parts of Australia and Tasmania. The Dartmoor form is distinctive.

Zeuner (1943) has, after studying the evolution of *Troides* and its allies during the Pleistocene, concluded that in the Malayan and Australian regions, as in Europe, "the rate of evolution of a taxonomic species .... is roughly the same as in Europe, i.e. about equal to the duration of the Pleistocene". Development of fourteen of the most recent Present day subspecies of *Troides* he demonstrated to have occurred between the end of the Last Glaciation (Würm 3) and the Present; other more clearly defined subspecies were older, dating probably from the Upper Pleistocene. According to Ford (1945, p.321)

45 per cent. of Pleistocene (Pre-Würm glacial) arrivals in the British Islands had formed subspecies, whereas only 10 per cent. of Holocene arrivals had done so, and these were very simple changes. On an average he considered the length of time since the Last Glaciation rather short for butterflies to have formed subspecies in the British Isles.

If these and other similar deductions as to time factor have validity, it is possible to consider that the formation of the rather distinctive subspecies *Oreixenica k. kanunda* as well as *Tisiphone a. antoni* and *Heteronympha c. wilsoni* may have required at least the whole interval between the latest phase of the Last Glaciation (Würm 3) and the Present. The extensions of their habitat to South Australia may have been events of the Last Glaciation and their subspecific differentiation commenced with the onset of Post-glacial times. In such a case the climate has at no time since been sufficiently arid to cause any one of them to become extinct, but on the contrary it has remained relatively moist until, at a late stage, it may have declined to about its present degree of aridity.

These inferences as to climate and those by Tindale (1947) appear to be in direct contradiction to conclusions reached by Crocker (1941, 1946) on the basis of soil data, and by Crocker and Wood (1947) on the basis of the development of plant communities in South Australia.

According to the last-named authors, South Australia is at present in a stage of recovery from a catastrophic period which is termed the "Great Arid". This was an age of maximum aridity which has had profound effects on the Southern Australian flora. Their discussion (1947, p. 129) seems to imply the virtually complete extinction of Pleistocene floral assemblages either about 4,000-6,000 years ago or (as a probable maximum) no more than 10,000 years ago. They infer the presence in late Recent times of vast, virtually bare areas, especially in the regions which are still arid. Present day communities thus are chiefly the results of Late Recent recolonization.

In view of apparently contradictory results, present day distributions of some plants quoted as evidence for the "Great Arid" by Crocker and Wood may be examined with profit.

Although a considerable amount of useful evidence has been brought together by them, some of it may be qualified. Other parts of it are subject to alternative explanations.

Acacia peuce, *Livistona Mariae* and *Macrozamia Macdonnelli* have such limited present day distributions that where they linger, any great degree of aridity over and above that prevailing at present would have entirely removed them. If rendered extinct there could not have been any re-entry unless conditions had been far more favourable than at present.

In the case of *Macrozamia Macdonnelli,* Crocker and Wood admit as necessary a theory of a change from a wet to a dry climate to account for its occurrence in Central Australia.

Present day areas of survival of *Acacia peuce* imply that there was a prior period when its distribution was relatively continuous. Now only two or three limited areas situated widely apart are sufficiently favourable for the growth of small populations. These areas are so relatively uniform as to altitude and general climate, that they might almost serve as a guarantee that since the pluvial conditions which assisted them to their present habitats, there has been no intervening drastic arid phase, over and above that being experienced at present. In the belt between 25° and 26° South Latitude therefore, conditions since a long pluvial episode of the Last Glaciation probably have not been over any long period much less favourable than at present, and it may be that the climate is only now tending towards an arid phase from this formerly more pluvial one.

The distribution of *Eucalyptus cladocalyx* in South Australia also may be illuminating. According to Crocker (1946), this tree may be verging towards the lower limit of its edapho-climatic range, and on Eyre Peninsula it is particularly depauperate. Could it have withstood any further great degree of aridity without extinction? Perhaps as in the moisture-loving *Tisiphone, Oreixenica* and *Heteronympha* referred to in an earlier part of this paper, it has only recently been isolated by onset of less favourable conditions. Sub-specific differences between the forms present on the three areas about the South Australian gulfs are not noticed by Crocker and Wood. It might be assumed that separation of the three areas is a relatively late event in the history of *E. cladocalyx.* Like the butterfly *Tisiphone,* the species has lately been isolated within its larger area of isolation by a current phase of deterioration in climate. It would be an interesting and perhaps profitable exercise to attempt to determine what degree of amelioration of climate would be sufficient to again link together these three isolation areas, and further, what conditions would be necessary to join the Gulf region of South Australia to the main South-Eastern Australian areas from which the parent form seems to have come.

Situations similar to those encountered in the case of *E. cladocalyx* appear to govern the present distribution of *E. macrorryncha* and *E. hemiphloia.*

The *Eucalyptus Baxteri* situation in the Upper South East has been quoted by Crocker and Wood as evidence for a recent northward extension of its range following amelioration of climate. The trees at the northern limit are reduced to depauperate shrubs. They develop into trees only as one goes south into country of higher rainfall. The point of view is possible that this is no vigorous tree, successfully invading new territory as it becomes available with relaxation of climatic stress, but that rather it is a not insignificant example of a relict form, struggling to maintain itself in a deteriorating climate. Its widespread occurrence as a depauperate shrub and the possible absence of evidence of active advance may tend to support the latter conclusion.

It is not intended to bring up the wider issues of the problem of aridity in South and Central Australia, raised by Crocker and Wood, since these might better be separately discussed. Suffice to say that dune systems south of the Mann Range in the far north-west of South Australia, examined by the present writer, also ones seen near Birdsville, Queensland, appear to be actively developing under the climatic conditions of to-day. It may not be necessary to appeal to a "Great Arid" period, now vanished, to account for these dune systems.

Some of the data used for establishing the existence of the "Great Arid", and for a Recent wet period following it, by Crocker (1941, 1946) and summarized by Crocker and Wood (1947) may be of a composite nature, referring to climatic episodes far-sundered in time.

Two instances may be cited; they comprise two of the principal listed items of evidence for Crocker's post-"Great Arid" improvement in climate

The *Notopala wanjakalda* horizon at Burdett in the Lower Murray Valley was re-examined by Tindale (1947, p. 635). The shells at this site were shown to be *in situ* in a section of Pleistocene lagoonal beds at an elevation of 65 ft. above present sea level, and therefore to be identified in age as possibly Monastirian I.

The siliceous sands of the South-East, thought by Crocker to indicate the same post-"Great Arid" period, are present on the surfaces of the Woakwine Range (or 25 foot terrace). These siliceous sands are residuals, derived by leaching of the predominantly limesand from surface layers of Woakwine Range dunes. They are therefore post-Monastirian II. Similar sands occur on each of the earlier marine terraces of the area. Due allowance being made for wind drift, they are indicative only of pluvial conditions at times posterior to the period of formation of the particular dune range from which they are derived and upon which they may occur.

Monastirian I and Monastirian II represent interglacial stages in the Upper Pleistocene. Monastirian I is placed by Zeuner (1945) as 150,000 years ago, while Monastirian II at latest is placed at 65,000 years ago, and may be older.

It thus would appear that some of the changes observed by Crocker and Wood may have taken a far greater period of time than considered necessary by them, and it would seem that at least an appreciable portion of the Upper Pleistocene may be involved.

Some of the data used as evidence for a "Great Arid" should perhaps be re-examined and further study made to differentiate between items of different ages in the Upper Pleistocene. Despite the possible break-down in evidence for Crocker's "Great Arid" as a Post-Glacial event, there is evidence to show that there was a Recent period of high sea levels, the Post-Glacial High Terrace (5–10 ft.), during which a slightly warmer climate than at present may have prevailed in South Australia. Evidence that this was a period so dry as to be the "Great Arid" postulated by Crocker, has yet to be marshalled.

It will be as well therefore to examine some of the information available about the climates of the Upper Pleistocene and Recent time.

The latest event of Pleistocene time was a glacial period (Würm 3) from which the world is now in a stage of recovery. The effects of such a recovery on the climates near the poles are relatively clear. It is well understood that variations of climate observable in one latitude may be diametrically opposite to those occurring simultaneously in another; when tracing the effects of glacial and interglacial conditions from high latitudes to low ones, particular caution is necessary.

Attempts have been made to study Pleistocene and Recent climates in middle latitudes. Zeuner (1945, p. 221), for example, developed curves of summer radiation affecting different latitudes in the later half of the Pleistocene and the Recent. One such curve gives data for 25° South Latitude. He applied this information to a study of South Africa. Here, during the Last (Würm) Glaciation, summer radiation was low and pluvial conditions prevailed. At 25° South Latitude summer radiation since the end of Würm 3 has steadily increased. In the past 10,000 years the caloric equator has been moving away from the south. Starting with the pluvial conditions of the beginning of Recent time in South Africa, there has been increasing desiccation. According to his interpretation the movement of the caloric equator northward came to a stand-still about 1,200 A.D., and both radiation and caloric equator curves are beginning to return from a minor maximum of that date, suggesting a possible slight climatic amelioration at middle latitudes, only in the past few hundred years.

It will be seen from the trend of the evidence referred to earlier that conditions similar to those prevailing in South Africa may have occurred in South Central Australia during the time between the end of the Pleistocene and the Present.

Strongest support for a relatively warm and dry interval of about 2,000 years' duration, and dated between 4,000 and 6,000 years ago, may come from pollen profile evidence in Northern Europe. Since warmer, drier climates in

N. Europe bring on an amelioration of the relatively severe climates experienced there, this period is sometimes given the somewhat misleading title of a "climatic optimum". According to Flint (1947) evidence for one such Postglacial interval is clearly established in Scandinavia and in the Alps, where the snowline may have been as much as 1,000 feet higher than to-day. It has been calculated that in North America at this time average summer temperatures may have been 1·5° C. above the Present and the duration of summer may have been about 15 days longer than to-day.

This degree of increase of warmth compares with an estimated 10° C. range over the whole gamut from a glacial to an interglacial climate.

On the North American continent, the Postglacial warm period produced changes which were most noticeable between 40°–50° N. latitude and least evident between 30° and 40°. In the latter belt the "climatic optimum" may have been somewhat drier without any marked increase in temperature.

The "Postglacial optimum", by several authors, as summarized by Stearns (1945) is equated with the temporary high shorelines between 5 and 10 feet above present sea level, which are evident in most parts of the world.

Possible indications are available for a progressive decline in rainfall in the Murray Valley, South Australia (between 34° and 35° South Latitude), during a part of Recent time. This evidence may reflect events in the whole Murray-Darling Basin, rather than actual local rainfall. The indications were found during the excavation of Devon Downs Rockshelter by Hale and Tindale (1930, p. 214). The indicator took the form of a changing ratio of fresh-to-brackish-water shells in stratified deposits extending from a depth of 6 metres (21 feet). These deposits revealed a change from a freshwater-shell-dominant regime to a brackish-water-shell dominant one. This progressive deterioration may have taken place over a considerable period in Recent time, between an aboriginal cultural period called *Pirrian* and the *Murundian* cultural period of the present day. The time interval *Pirrian-Present* has not yet been established on the absolute scale. It may have involved at least several thousand years, although it almost certainly did not go back beyond the period of Post-Glacial High (10 ft. terrace), since it has been shown by Tindale (1937, p. 52) that at Fulham, South Australia, a Pirrian horizon lies above marine beds identified as of this terrace. During the passage of this interval, however, at least one minor faunal change has taken place, namely the extinction, on the Australian mainland, of the Tasmanian Devil (*Sarcophilus*).

Consideration of some of the above data therefore may lead to the conclusion that as a Post-Glacial phenomenon the "Great Arid" hypothesis of Crocker, in its present form, should be abandoned. The indications on which it was based may be far older than appear at first sight, belonging either to Monastirian II or if the situation be more complex than as sketched by Crocker and Wood, may date in part to Monastirian II and in part to Monastirian I, during both of which there seem to have been arid periods of long duration. It is more than probable also that periods of aridity during still earlier inter-glacials have had profound effects on Australia and its fauna and flora.

SUMMARY.

A new race, *kanunda*, of the Satyrid butterfly, *Oreixenica kershawi*, is described from the Millicent district in the South-East of South Australia, together with another form, *phryne*, from the Federal Capital Territory.

On the basis of the occurrence of this humid climate requiring insect, and the other evidence (Tindale, 1947 (1)), it is suggested that the climate of Post-Pleistocene times in Southern Australia has been slowly deteriorating from one of pluvial conditions. The "Great Arid" hypothesis for this period, suggested by Crocker (1941) and discussed recently by Crocker and Wood (1947), is thought to be untenable.

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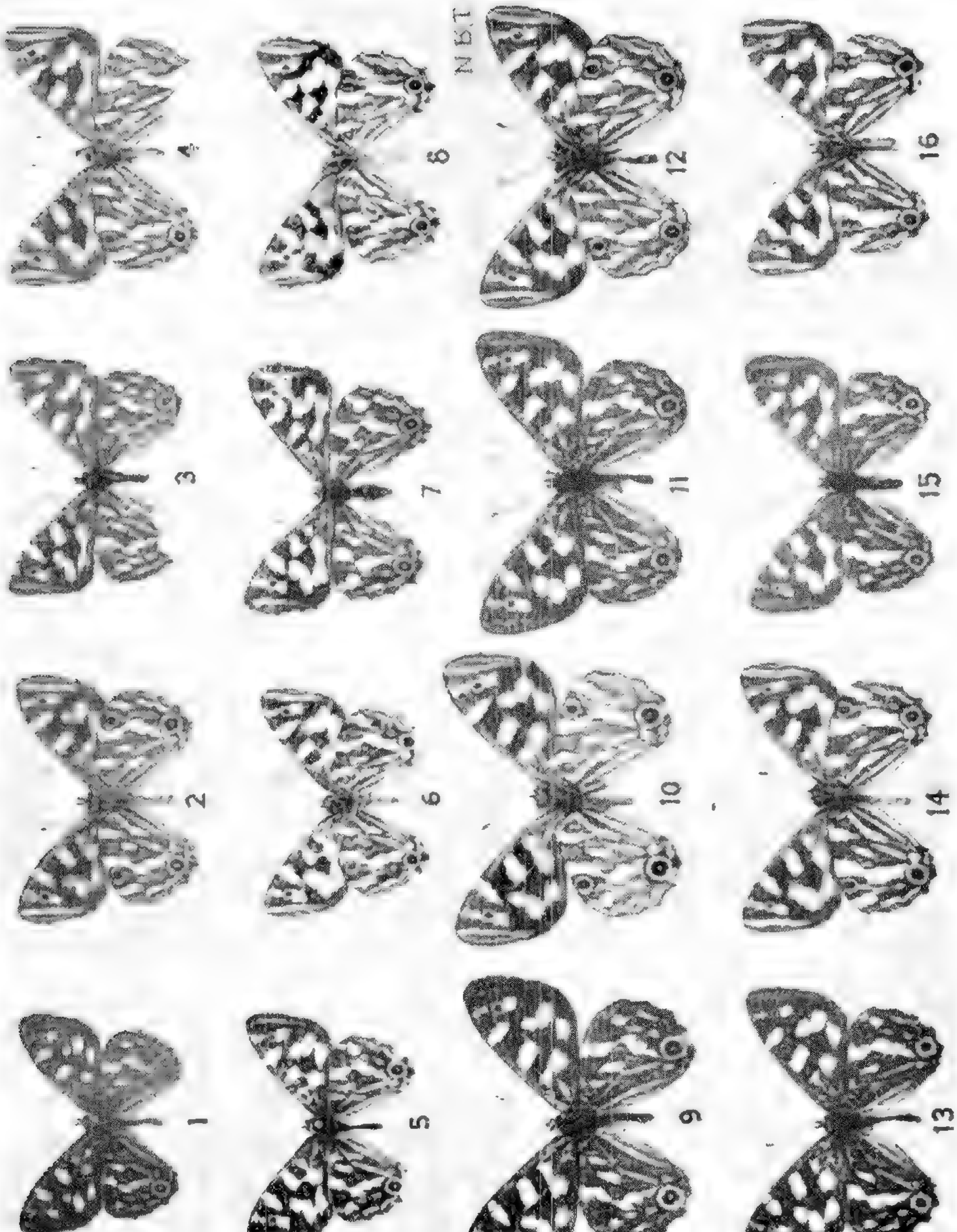
EXPLANATION OF PLATE XII.

Fig. 1–4. *Oreixenica k. kershawi* Miskin. Fig. 1–2, male, Mt. Erica, Victoria, upper and under sides. Fig. 3–4, female, Fern Tree Gully, Victoria, upper and under sides; slightly under natural size.

Fig. 5–8. *Oreixenica k. kanunda* subsp. nov. Fig. 5–6, allotype male, Canunda, S.A., upper and under sides. Fig. 7–8, holotype female, Canunda, S.A., upper and under sides; natural size.

Fig. 9–12. *Oreixenica k. phryne* subsp. nov. Fig. 9–10, paratype male, Lee Spring, F.C.T., upper and under sides. Fig. 11–12, holotype male, Lee Spring, F.C.T., upper and under sides; natural size.

Fig. 13–16. *Oreixenica k. ella* Olliff. Fig. 13–14, male, Barrington Tops, N.S.W., upper and under sides. Fig. 15–16, female, Barrington Tops, N.S.W., upper and under sides; natural size.



Races of Oreixenica kershawi Miskin.